

# INNOVATION, VENTURE CAPITAL AND GLOBALIZATION: THE ROLE OF PUBLIC POLICIES

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## INTRODUCTION

Sustained improvements in living standards that can address environmental and security concerns demand new ideas and fresh thinking that lead to valued products and services. Innovation is a risky but potentially highly rewarding business. New companies, which play a critical role in driving innovation, require financing that is adapted to their specific needs. This is unlikely to be provided by conventional financial intermediaries, such as banks. As a result, the development of an active venture capital industry that can provide not only financing but also managerial and technical skills to innovative companies has become an important component of innovation policies. This essay will briefly present the characteristics of the financing offered by these specialized intermediaries, the rationale for public involvement and the different ways in which public actions may influence venture capital financing. Changes in the geography of innovation and the internationalization of economic activities are influencing both the operations of venture capital companies and public policies.

## FINANCING INNOVATIVE ENTERPRISES

Small, new companies are critical in driving innovation because existing organizations have difficulties in adapting to changing environments or introducing radical innovations that may negate the value of their existing assets or business models. Industry leaders perform well in sustaining innovation along existing lines but new ideas and disruptive innovations can find a more fertile ground outside the established corporation, where research is more oriented on developing or improving existing lines.

The inability to spot new technologies quickly may not be the determinant factor preventing established companies from adopting them. The reasons for inertia may lie in the lack of attraction of these technological alternatives under existing cost structures and target markets. Some technologies may even perform worse in the short term or cannibalize sales from more lucrative product lines.<sup>20</sup> However, these so-called disruptive technologies may undergo rapid improvements and threaten established technologies. A similar reasoning can be applied to products, process and business models.

A decentralized research structure generates a flow of new ideas and allows spotting and taking advantage of new opportunities quickly. However, the transformation of ideas into commercially successful propositions is a complex process, which requires the contribution of different types of skills, in addition to those that generated the initial idea or invention. Obtaining adequate financing through the various stages of development of a new company is central for successful commercialization.

However, this poses considerable challenges, as the financing of young high-tech companies is a risky business, plagued by uncertainty and information gaps, which render difficult the assessment of the prospects of these firms by potential financial providers. Cash-flows are uncertain and unpredictable. Intangible assets, such as intellectual property, are at the core of early-stage high-tech companies, but these are not easily accepted as collateral. Better and widely acknowledged reporting practices on intellectual assets would facilitate the task of raising finance but progress in this area is yet limited. The ability to pledge collateral determines the amount and type of financing that can be raised.

## RISK AND REWARD: THE CASE FOR EQUITY FINANCING

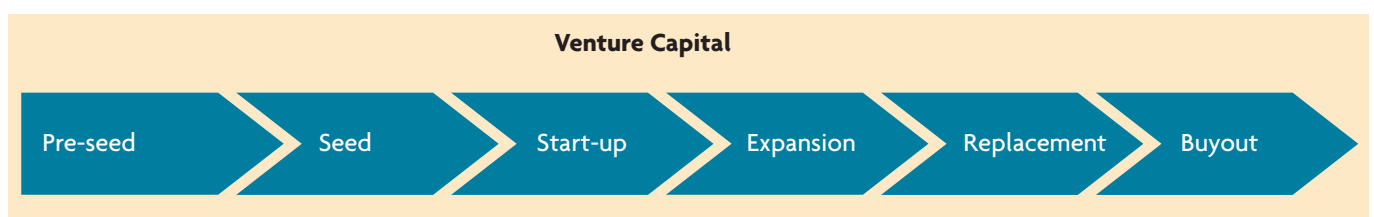
Bank lending is ill-suited to the financial needs of high-risk innovative companies with limited collateral. Instead, the most appropriate instrument appears to be equity financing, which is better able to accept the high level of risk and to accommodate the uncertain profile of cashflow generation. Specialized financial intermediaries have emerged that respond to the particular financial needs of innovative enterprises, where investments are characterized by large periods before they yield a profit and poor liquidity. These are generally referred to as venture capitalists or venture capital firms.

<sup>20</sup> Clayton Christensen, *The innovator's dilemma. When new technologies cause great firms to fail*, Harvard Business School Press, Boston, 1997.



Venture capital must be distinguished from the broader concept of private equity. Private equity encompasses the provision of equity capital to companies not publicly traded. Venture capital is a subset of this category, concerning only equity investments supporting the initial launch, early development and expansion of a business. This distinction is very important as the concepts are sometimes used interchangeably despite the fact that they refer to very different types of companies and investments. In addition to formal venture capitalists, which raise money from institutional investors and invest these resources in promising companies, there are business angels, who are private individuals that invest their own money. Business angels, who are also known as informal venture capitalists, can therefore keep all the returns from their investment. They tend to focus on younger companies and make a larger number of smaller investments than their formal counterparts.

Figure 1. Financing through the life of a company



Venture capitalists (both formal and informal) are not entitled to receive a pre-determined rate of return on their investment. As equity investors, they share the risks of failure with the companies in which they invest but also participate in any upside in the value of their investments.

Most of the companies in which venture capitalists invest are based on intangible assets. The success of these innovative companies depends on the ability to exploit and protect these assets, which requires a range of skills, often beyond those present among the initial founders. These specialized financial intermediaries bring to the companies in which they invest not only financial resources but also technical and managerial expertise, including knowledge of the markets and networks of contacts. These are critical aspects to support the growth potential of high-tech firms at the early stages of their development. High-tech companies require a significant degree of trial and error experimentation, which demands long-term investment horizons.

Venture investors seek to limit the risks they incur when backing innovative firms through techniques that are characteristic of this type of financing. High risk is offset by initial careful (but costly) due diligence and robust oversight rights. The importance of a rigorous screening process, supported by a strong system of incentives and information resources, is at the heart of venture capital investing. Staged financing serves as a monitoring tool, since only projects that remain promising through their lifecycle continue to receive funding. In addition, venture capital firms tend to co-invest with others in order to share information and risks.

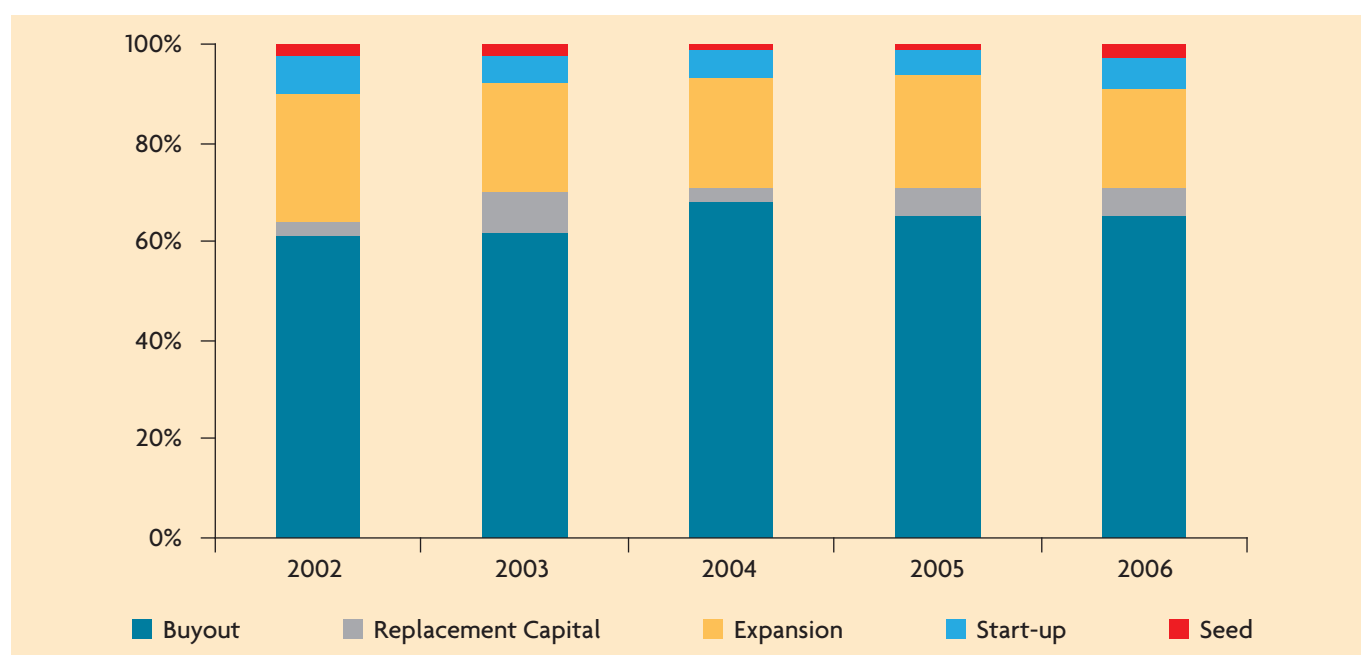
Scale has important implications for the profitability and scope of operations of venture capital firms, as it facilitates industry specialization, makes possible large investments per enterprise and spreads out fixed costs. Large funds can better support the companies in which they invest through their expansion, including necessary internationalization and final sale. In fast moving, high-tech markets with strong competition, commercial opportunity may soon evaporate if ideas are not quickly put into action with appropriate funding.

However, all companies start small, although successful ones may grow very rapidly. The role of informal venture capitalists or business angels has been increasingly recognized as critical to ensure that financing is available through the various stages in the life of a company. The presence of professional venture capital firms in early stage financing (seed and start-up) is limited, as the amount of funds required is too small and returns offered by alternative investment are higher. The annualized net pooled internal rates of return since inception to the end of 2006 computed by the European Private Equity and Venture Capital Association (EVCA) show that early stage funds yielded -0.1 per cent, against 5.5 per cent for all venture capital funds and 14.4 per cent for buyouts. The return for the top quartile early stage funds was 13.1 per cent, suggesting a strong dispersion in performance, consistent with the high levels of risk.

As a result, business angels tend to be the dominant investors in the seed and start-up phases, with the ability to screen many opportunities and invest in many companies that would not attract the attention of formal venture capitalists. The successful development of a company requires that financing be available through the various stages of its life, avoiding any possible bottlenecks. From the point of view of the venture capital industry, suitable opportunities for investment at later stages only appear when a potential supply of companies has been created by early-stage financing.

Chart 1. Private equity, stage distribution

As percentage of total



In addition to venture capital firms and business angels, established companies can also be a source of venture financing for other new firms. Corporate venture capital refers to equity investments by existing non-financial corporations into entrepreneurial ventures. There are many strategic benefits from this type of investment for established companies, including the possibility to study new markets and technologies and learning opportunities, even in the case of failures. Linking with start-ups allows incumbents to gather information about the technologies and business models these new companies are developing. However, academic research shows mixed evidence on its effectiveness, which underlines the difficulties of overcoming organizational inertia in fostering innovation.

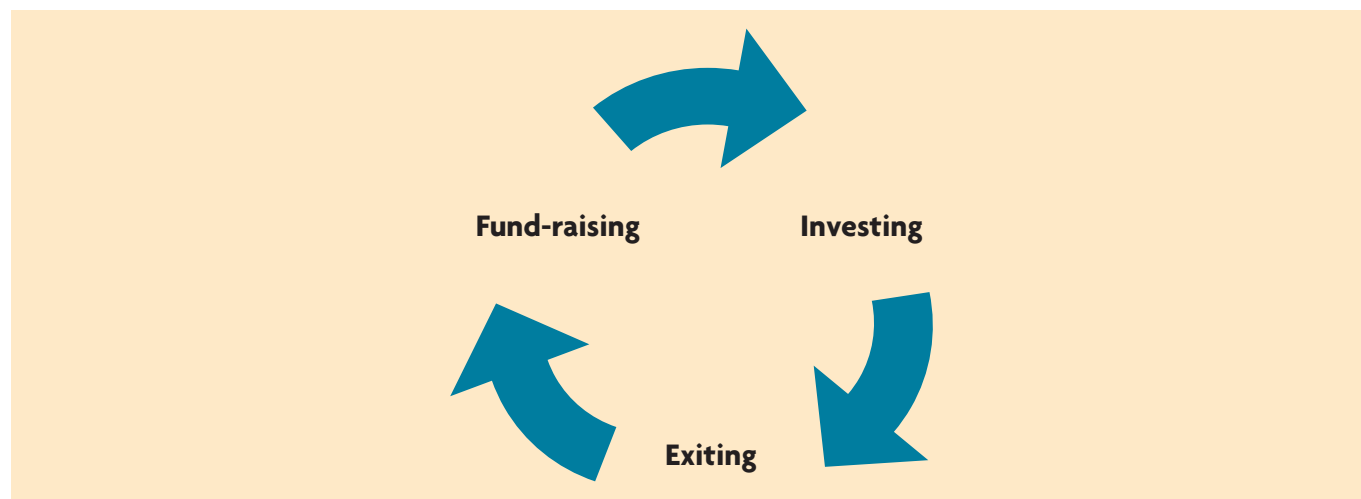
## THE VENTURE CAPITAL CYCLE

Venture capital firms raise financing from institutional investors (or use their own money, if they are business angels), invest these resources in promising companies and eventually sell the stakes they held to realize a profit. This basic scheme (from fund-raising to exit) constitutes the so-called venture capital cycle. Venture capital investments are illiquid, long-term assets that are suited for institutional investors such as pension funds. National differences in the development of a funded pension system and the degree of freedom on portfolio allocation are important influences on the ability of venture capital firms to raise financing.

The venture capital industry has a marked cyclical character. Fund-raising and investment commitments cannot react quickly to changes in expected returns. There are also significant information lags: venture capital investments are not valued on a daily basis, as is the case of investments in mutual funds. This makes it difficult to assess the current value of the investment.

As is often the case in investment, ample liquidity can lead to a deterioration of the quality of decisions on the deployment of capital. Too much money is likely to result in increases in the amounts invested upfront, thus weakening mechanisms such as staged financing and syndication that serve to reduce risk.

Figure 2. The venture capital cycle



The collapse of the dot com boom in 2000 provides a recent illustration of the cyclical character of the industry. Fund-raising by venture capital funds reached record levels in the late 1990s. Less competent funds managed to raise money, amid a general decline of standards, leading to poor investment decisions. Too much money chasing too few viable deals resulted in falling returns, over-investment and the eventual collapse of fund-raising. A recovery has taken place in recent years, although amounts remain well below those observed during those frenzied years. The focus of the venture capital industry narrowed during the 1990s, when the emphasis was on IT and life-sciences, but since the end of the Internet bubble, there has been a broadening of investors' interests.

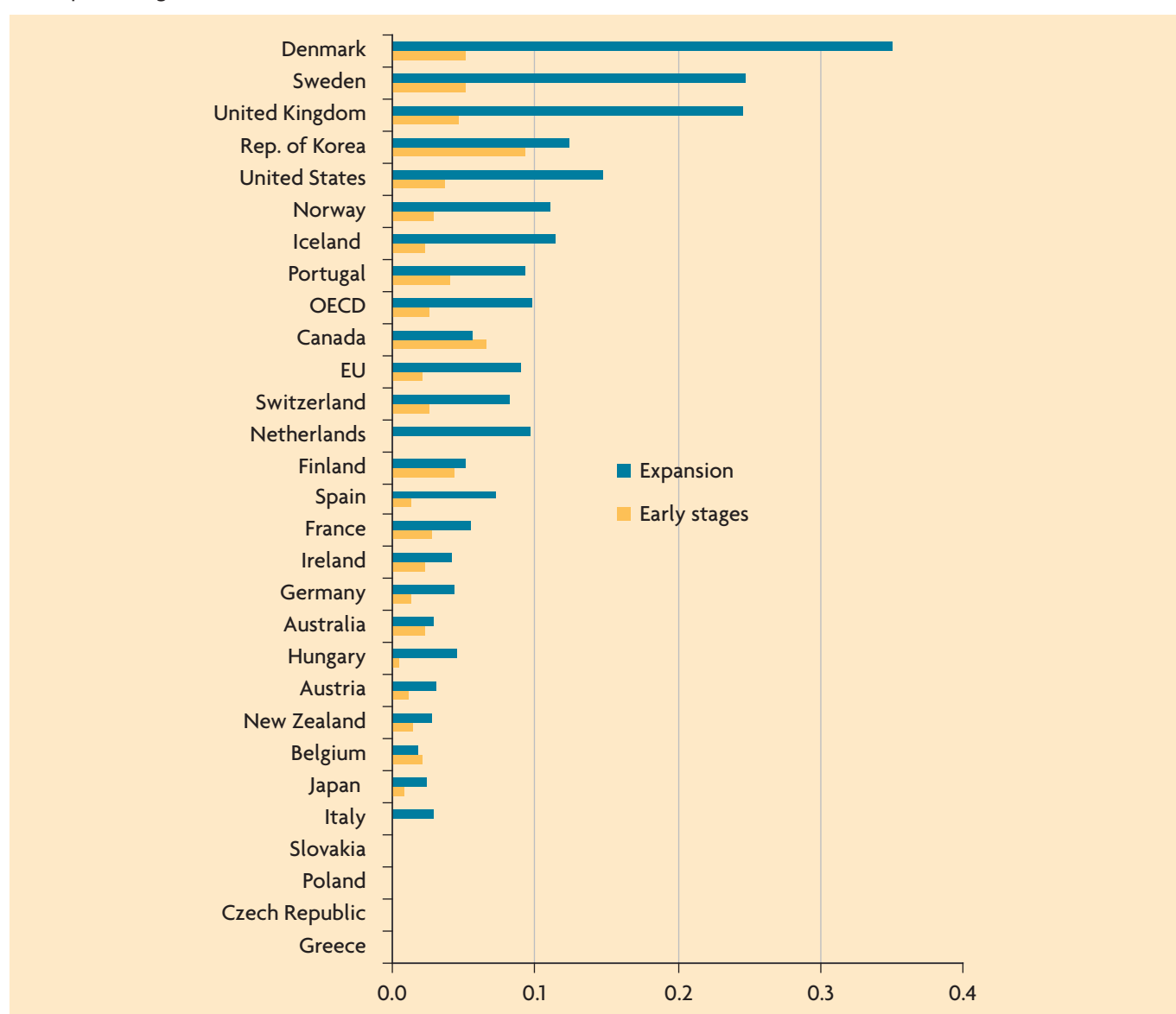
Venture capital firms are not interested in building a long-term portfolio in the firms in which they invest. The main incentive for equity investors in innovative enterprises is to be able to realize a significant capital gain when selling stakes in the company. Clear exit options through well organized public exchanges therefore play an important role in the creation of suitable incentives for venture capital. Trade sales (i.e. to an existing company or another investor) can be an alternative to the availability of exit through organized exchanges. However, they can be less lucrative. In any case, the existence of competing buyers is critical for a successful exit.

## VENTURE CAPITAL AND INNOVATION

Technological innovation has been closely linked to venture capital financing. Increasing the availability of private sector innovation financing to enterprises and optimizing the relevant legal/regulatory framework are explicit components of the EU TrendChart Innovation Policy Framework. The EU Innovation Scoreboard, which monitors a number of variables linked to innovation, includes the availability of early-stage venture capital as one of its input-based components. The Science, Technology and Industry Scoreboard of the Organisation for Economic Co-operation and Development also regularly tracks venture capital dynamics as a key source of funding for new-technology firms.

Chart 2. Venture capital investment 2005 or latest available year


As percentage of GDP



Source: OECD Science, Technology and Industry Scoreboard 2007

There are strong cross-country differences in venture capital financing. International comparisons usually only take into account figures related to the activity of formal venture capital firms. Coverage is far from perfect but nevertheless more readily available than that of informal investors. In Europe, there was a large increase in early stage financing (seed and start up) by venture capital firms in 2006, which resulted in reported nominal levels exceeding those observed in the United States (EUR 5.9 billion against EUR 4.1 billion). However, investment by business angels, which focus mostly on early stage financing,





is much larger in the United States than in Europe (around six times more in 2006, according to estimates produced by the US Center for Venture Research and the European Business Angel Network).

Venture capitalists are attracted to technologies with a significant potential for disruptive change that can generate sizeable returns. These are necessary to provide adequate compensation for the significant risk incurred in transforming creative ideas originating in the laboratory or the university into market products. Mature industries are unlikely to provide this sort of opportunity, so the interest of venture capital is on sectors at the forefront of technological change with high innovation rates.

However, innovation is a risky business where spotting future success is a difficult matter. The techniques used by venture capital financing seek to reduce the chance of failure while, at the same time, resulting in a better allocation of the resources used. Venture capital (both formal and informal) is sometimes referred as “smart money”, implying that this type of financing brings more than resources to the companies in which these specialized financial intermediaries invest. Intensive screening of potential opportunities and close monitoring of investments are defining features of venture capital financing. This helps to overcome information asymmetries and reduces moral hazard, thus resulting in better investment decisions.

The beneficial effect of venture capital on innovation is confirmed by academic research, mostly based on the rich experience in the United States. Venture capitalists speed up the development of companies in which they invest, as venture capital backed companies tend to be younger when they are able to go public. Research also suggests that these firms tend to be more innovative, as measured by the number of highly quoted patents produced. Reverse causation is an obvious possibility, i.e. innovative companies being more likely to use venture capital as a form of financing could be a more significant influence than the fact that venture capital backed firms are more innovative. However, even controlling for this factor, research continues to suggest that companies with venture capital participation have a disproportionately large influence on innovation.<sup>21</sup>

The impact of venture capital financing on innovation is also affected by the cyclical nature of investing. In periods of exuberance, herding behaviour leads to a decline in the effectiveness of the capital deployed, as discussed above. Investors tend to back similar firms and valuations increase excessively.<sup>22</sup> The policy implication is that the use of public resources should be mindful of these dynamics, aiming to have a countercyclical effect, instead of amplifying volatility by replicating the behaviour of private investors.

## GLOBALIZATION AND VENTURE FINANCING

As in other areas of economic activity, the venture capital industry is increasingly influenced by globalization trends. This concerns both the target enterprises and, even, the operations of venture capital firms themselves.

There is a strong link between growth and internationalization. Innovative firms compete in a global marketplace and need to have an international strategy to achieve ambitious expansion targets. This is particularly important for those which are located in countries with small domestic markets. In order to provide effective support to these companies, venture capital firms must facilitate their access to the networks and skills required to enter international markets and provide the capital required to facilitate expansion at such scale.

As venture-backed companies become increasingly global, looking for low cost centres of technology and access to international markets, venture capital firms are forced also to have a global perspective. The industry itself is becoming more competitive and venture funds want to increase their visibility in international markets. Thus, a global venture capital industry, which scouts for investment opportunities worldwide, is emerging. According to Ernst & Young, cross-border venture capital investment accounted for almost 20 per cent of the total in 2005-2006, more than 250 per cent up over the preceding five years.

Emerging markets figure prominently in the strategies of large international investment funds. To some extent, this mirrors the changing geography of innovation, with growing technological expertise in countries such as China and India and the realization that an unexploited potential exists in some of the countries with economies in transition. At the European level, the ongoing efforts to reduce the barriers that prevent cross-border investment and fund-raising are opening new vistas for the development of venture financing.

<sup>21</sup> Samule Kortum and Josh Lerner, “Assessing the contribution of venture capital to innovation”, *Rand Journal of Economics*, 31, 2000.

<sup>22</sup> Josh Lerner, “Boom and bust in the venture capital industry and the impact on innovation”, *Federal Reserve of Atlanta Economic Review*, Fourth Quarter 2002.

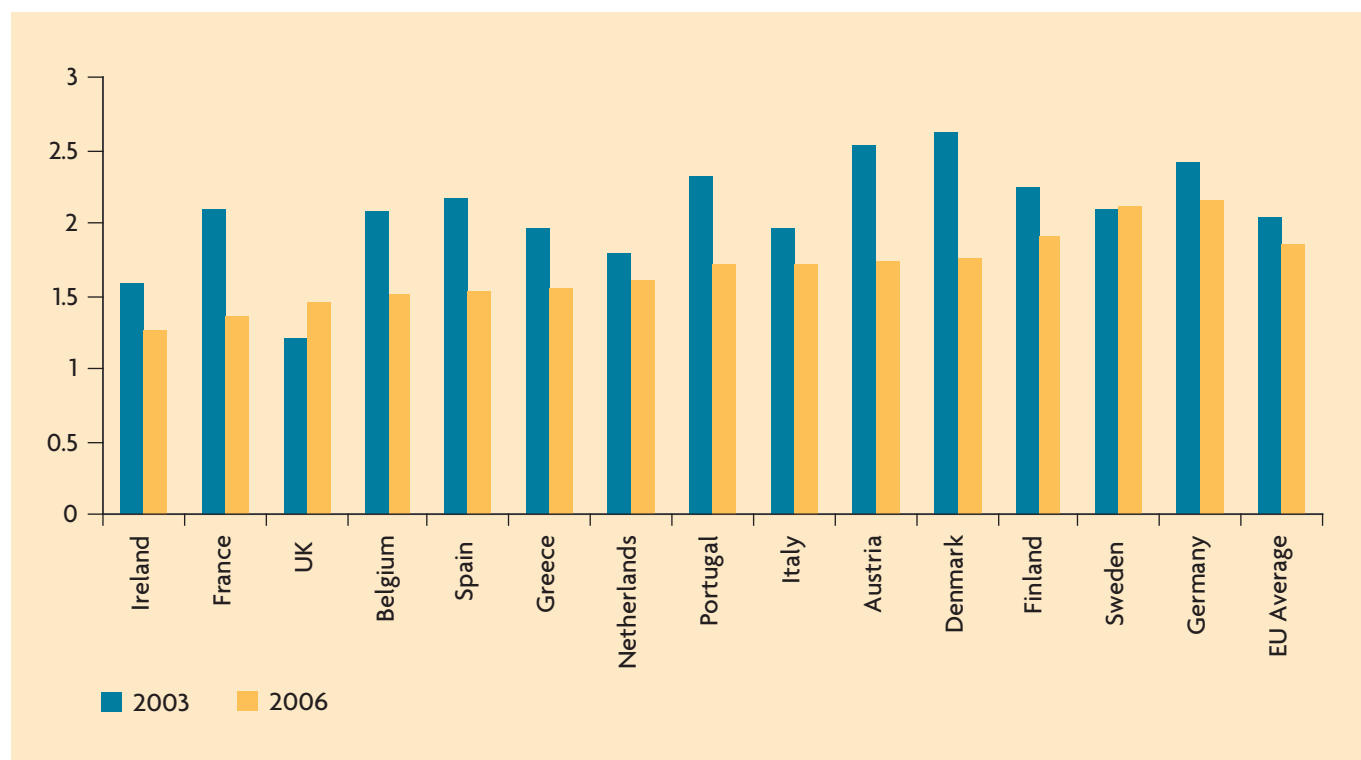
The internationalization of the activity of venture capital firms also poses some challenges. Exit strategies abroad can be more complicated, as domestic exchanges may not offer sufficient liquidity. However, the development of a domestic stock market may not be an essential requirement. Israeli companies have overcome domestic limitations by floating in the US NASDAQ. Moreover, the globalization of capital markets has also provided new exit alternatives, with the United States no longer being the default option for companies that are looking for opportunities beyond their domestic markets.

Although the need to retain a global orientation is quite clear, the local dimension of early-stage financing remains fundamental. Global firms have strived to reconcile the desire to tap into global investment opportunities with the need to continue to provide hands-on assistance to local companies, which requires a local presence. Venture capital firms are using business models such as strategic partnerships with local funds or the use of global brands to encompass different local operators. In this way, local investment opportunities can be recognized while enjoying at the same time access to international networks. This development has been accompanied by a trend towards larger funds that can invest in capital-intensive sectors, all the way to exit. Local smaller funds can collaborate with these larger, more internationally oriented venture capital firms. In the informal segment of venture capital investment (business angels), which has an intrinsic more local orientation, cross-border syndication and networking have also resulted in an increasing interest in foreign investment.


## PUBLIC SUPPORT TO VENTURE FINANCING

In view of the generally acknowledged positive impact of venture financing on innovation, public policies around the world have attempted to replicate the success that venture capital has achieved in the United States. The desire to overcome the so called European Paradox – the inability to convert excellence in research into marketable applications – has spurred an interest in identifying and overcoming any obstacles to the successful commercialization of technologies, including financing. Many different initiatives have emerged and, as a result, the overall regulatory and tax environment for venture capital financing has improved in recent years.

Chart 3. Benchmarking environment for private equity/venture capital



Source: EVCA, Note: 1=more favourable, 3=less favourable.



This interest has also emerged in many countries with economies in transition with a significant scientific potential that is not matched by their innovation achievements. In Kazakhstan and the Russian Federation, in particular, large government-backed venture capital programmes have been put in place to ensure that promising innovative technology-based companies have access to adequate funding.

Generally speaking, the development of venture capital markets has generally benefited from direct or indirect public support in most countries. Historical experience shows that public policies have played an important role in nurturing and sometimes kick starting the industry in most countries. In addition to initiatives to improve the framework conditions for financing, specific support programmes have been put in place.<sup>23</sup>

However, there are still large gaps in our knowledge of how policies can positively influence the development of an active venture capital market. To start with, it is unclear that the lack of financing is the determining constraint explaining poor innovation results. The direction of the causality between innovation activity and venture capital is not completely clear. There is a body of research that argues that the existence of opportunities for investment has been the main driver for the ulterior emergence of a venture capital industry. While the evidence may not be conclusive, the dynamic relation between investment opportunities (a sufficiently robust deal flow) and the development of a venture capital industry appears to be validated by historical evidence. Overall innovation policies play an important role in fostering the venture capital industry, as they result in new investment possibilities.

It is therefore accepted that new technologies – the result of innovation policies – create entrepreneurial opportunities that could generate demand for venture capital financing. However, the dynamics of enterprise creation are greatly influenced by the institutional environment. The sensitivity to institutional factors is particularly marked in catching-up economies, with a positive environment facilitating not only the entry of new firms but also the development of start-ups into larger firms.

The conclusion that could be drawn from the existing linkages between factors influencing the demand and the supply of risk capital is that an underdeveloped venture capital industry may not be the key constraint holding back innovation. However, there is a strong rationale for public intervention to foster the development of this form of financing, as a component of overall innovation policies that consider the dynamic interrelation between the various determinants of innovation.

From a general point of view, this rationale can be framed in terms of the traditional market failure argument. R&D spillovers result in investments below social optimum. Positive externalities arise from the inability of innovative companies to capture rents that accrue to competitors introducing imitations or complementary products. These problems are particularly prevalent in early stage companies. There is therefore a public interest in helping these companies to overcome the difficulties that constrain their development, including through better conditions for raising finance.

A developed venture capital industry provides opportunities for access to finance by new innovative enterprises. Increasing returns arguments justify public intervention to support the development of this industry, particularly in countries where it is less mature. Individual investors benefit from the existence of professional services, information networks and general familiarity with the process of venture capital investing. As the industry develops, it becomes easier to operate for further entrants. However, individual investors are unable to exclude others from access to this infrastructure and therefore would under-invest in it.

## THE MULTIPLE DIMENSIONS OF PUBLIC INFLUENCE


As discussed in the preceding section, there are general arguments that support public intervention to address the financing problems of innovative enterprises, including through efforts dedicated to the development of a venture capital industry. This encompasses a range of initiatives, which address different bottlenecks on the financing process.

One of the specific issues targeted by policy efforts is the fact that private capital, including venture capital, tends to avoid participation in the very early stages in the development of a company, when risks are higher. The existence of this “equity gap” constrains the development of potentially viable new technology based companies. The problem may be particularly acute in less mature markets, where venture capital firms display a more conservative attitude and are attracted by opportunities elsewhere. According to the statistics compiled by the European Private Equity and Venture Capital Association, seed and

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<sup>23</sup> For a comprehensive review of the initiatives undertaken in this area see UNECE, Financing Innovative Development. A Comparative Review of the Experiences of UNECE Countries in Early-Stage Financing, Sales No. 08.II.E.2.





start-up investments accounted in 2006 for only 2.8 per cent of total private equity investment in Central and Eastern Europe, against 10.3 per cent for Europe as a whole. Public intervention often seeks to fill this gap through the provision of direct financing or actions that improve the risk-return profile of these investments, so encouraging private participation. The role of business angels has been increasingly recognized as a critical source of early-stage financing. As a consequence, the formation of networks and the development of related information markets has benefited from public support in some countries.

Besides this specific focus on the very early stages of development of a company, most public programmes of support to the venture capital industry are in many cases generally driven by the desire to increase the supply of risk capital. However, it is unclear that more funds can lead to more successful projects. If the number of initiatives with commercial potential is limited, throwing more resources at them could have a detrimental effect, depressing returns and crowding out private investment.

In this regard, a fundamental question is whether public efforts should be devoted to increasing the available supply of capital or the demand for funds. The answer may vary according to national circumstances. However, most research emphasizes the importance of considering demand factors, i.e. those influences that facilitate the commercialization of early-stage technology or create a positive environment for entrepreneurship. These efforts would increase the amount of investable opportunities. Important demand side factors are the entrepreneurial culture of a country, the quality of research institutions or the level of investment in R&D. The coordinated deployment of demand and supply policies can improve the effectiveness of public intervention. In particular, technology commercialization actions should be aligned with venture capital initiatives. In this regard, policy intervention in one area can be seen as creating new opportunities for the programmes being implemented in other areas.<sup>24</sup>

A related issue is whether the primary focus of policy actions should be increasing the availability of funds or supporting better effective returns in the industry. Some research suggests that the influence of expected returns on the development of an early-stage venture capital industry may be more critical than the availability of finance.<sup>25</sup> Those factors include the cost of creating a company and other barriers to entrepreneurship, the taxation regime and the effective possibilities for exit. In particular, the capital taxation regime, as distinct from that of ordinary income, influences both entrepreneurship and venture capital investment.


There is an additional argument that cautions against putting an exclusive emphasis on supply policies, i.e. those considering primarily the availability of finance. In countries where the venture capital industry is less developed, there may be a deficit of the necessary expertise. Additional funds are therefore unlikely to result in the sort of beneficial effects associated with venture capital, if not accompanied by complementary measures to address this skill shortage. Public programmes can provide a training ground for the first generation of venture capitalists.

The principles discussed above can serve to inform the general orientation of policies on the area of financing for innovative enterprises, including the simultaneous consideration of demand and supply aspects. However, at the more specific level of concrete interventions, it is clear that the careful design of any publicly funded support programme for venture capital financing is a key for its success. A critical issue is that the existing systems of incentives ensure that public participation does not distort the ability of venture financing to spot commercial opportunities through careful screening and the reward of success. The fund-of-funds model, where public resources are invested alongside private money, is generally acknowledged as a suitable arrangement. Fund managers take investment decisions and need to raise additional resources.

The rationale and the benefits of public intervention are generally acknowledged. However, there are also potential pitfalls that need to be avoided. Public programmes, in order to show good results, may avoid risk and conservatively back companies that could obtain financing elsewhere. If these programmes converge toward the same type of investments and market segments where private investors operate, there is the danger that this serves to arrest the development of the venture capital industry rather than foster it. On the contrary, public support can serve as an alternative to the herding behaviour of investors, funding technologies that are less popular. This assistance, which may be provided on the basis of broader environmental or economic concerns, may help the evolution of these technologies into more appealing commercial proposals. An important role is to generate variation, even at the cost of failure, to explore areas that could be eventually promising.

<sup>24</sup> Morris Teubal and Terttu Lukkonen, "Venture capital industries and policies : some cross-country comparisons", The Research Institute of the Finnish Economy Discussion Papers, No. 1006, 2006.

<sup>25</sup> Marco Da Rin, Giovanna Nicodano and Alessandro Sembenelli, "Public policy and the creation of active venture capital markets", European Central Bank Working Paper Series, No. 430, January 2005.



Overall, it is important to bear in mind that the development of a venture capital industry is an evolutionary process, involving a certain amount of institutional and policy experimentation. A general conclusion, which is a common thread through this note, is that venture capital policies need to be framed as a part of a general analysis of the national innovation system.

The discussion above has focused on public initiatives that explicitly target the financing problems of innovative enterprises and the development of the venture capital industry. In addition, public actions in other areas can also have a significant indirect impact on venture financing, as public policies also have an important role in defining markets for new products through regulation or procurement. In particular, the size of the market is a main determinant of expected profitability, contributing to reducing the impact of uncertainty in other inputs of financial projections. Besides, the public sector can make significant investments in promising technologies that address concerns such as environmental sustainability or energy security. However, private investors seek the development of products and markets to obtain a profit. In order to attract private financing and marketing expertise to the commercialization of these publicly-backed technologies, the regulatory environment needs to create a stable and conducive system of incentives.

A good example of the impact of public policies on creating new investment opportunities is the so-called “cleantech” (clean technologies) – an area which is increasingly favoured by venture capital investors. This generic name covers a wide range of sectors, including energy, water, pollution and waste and “green” consumer products. As with IT but in different ways, cleantech also promises an increase in efficiency, in this case driven by the desire to enhance environmental sustainability. Environmental concerns have also raised the potential technological content of traditionally low tech sectors, such as the water industry, thus drawing the interest of innovative enterprises and their financial backers.

A final point should be made on the overall background for the design and implementation of public policies to promote venture capital financing. As discussed earlier, globalization (both regarding the activities of innovative companies and the venture capital funds) has important implications for public policy. A national venture capital industry cannot be built without strong global links, which reflect the growing internationalization of venture investment. This underlines the importance of leveraging foreign capital and expertise in the design of public support programmes. Facilitating access of domestic companies to worldwide sources of capital by eliminating barriers to the cross-border operation of venture capital firms appears as an important dimension of public initiatives. This should ensure that financing and expertise is available through the various stages of the life of fast-growing innovative companies.